

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the subject application.

1. (Cancelled)

2. (Cancelled)

3. (Original) An endoscope inserting direction detecting system comprising:

endoscopic image domain dividing means for dividing an endoscopic image, which is imaged and produced by an endoscope inserted into a body cavity, into a plurality of domains; pixel sampling means for comparing the values of pixels constituting each of the domains, into which the endoscopic image domain dividing means divides the endoscopic image, with a threshold, and for sampling the distribution of pixels whose values are equal to or larger than the threshold;

suitability-for-lumen position defining means for defining domains representing suitability for a lumen position;

direction-of-lumen estimating means for defining a plurality of circles, which have different radii, over the domains representing suitability for a lumen and being defined by the suitability-for-lumen position defining means and the domains of the endoscopic image, and for estimating the direction of a lumen from the distribution of pixels which are sampled by the pixel sampling means because the values thereof are equal to or larger than the threshold and which are placed between the plurality of circles;

inserting direction determining means for determining an endoscope inserting direction over the domains, which represent suitability for a lumen position, on the basis of the direction of a lumen estimated by the direction-of-lumen estimating means; and

inserting direction display means on which an inserting direction is displayed together with the endoscopic image on the basis of the endoscope inserting direction determined by the inserting direction determining means.

4. (Original) An endoscope inserting direction detecting system according to Claim 3, wherein the pixel sampling means samples pixels that represent a halation caused by specular reflection in the body cavity or pixels that represent the edge of a fold on the inner wall of the body cavity.

5. (Original) An endoscope inserting direction detecting system according to Claim 3, wherein the direction-of-lumen estimating means estimates the direction of a lumen, which is useful in determining an inserting direction, from a difference in an angle between a vector whose initial point lies at the position of a center of balance in the distribution of pixels sampled by the pixel sampling means and whose terminal point lies at the position of the center of a domain representing suitability for a lumen position out of all the domains defined by the suitability-for-lumen position defining means, and a vector orthogonal to a regression line expressing the distribution of pixels.

6. (Original) An endoscope inserting direction detecting system according to Claim 3, wherein the direction-of-lumen estimating means calculates a gradient vector that expresses each of pixels representing the edge of a fold and being sampled by the pixel sampling means, and estimates the direction of a lumen from the distribution of pixels that are expressed with gradient vectors having the same direction and that represent the edge.

7. (Original) An endoscope inserting direction detecting system according to Claim 3, wherein the centers of the plurality of circles having different radii and extending over the domains, which represent suitability for a lumen position and are defined by the suitability-for-lumen position defining means, and the domains of the endoscopic image are located in the same domain representing suitability for a lumen position.

8. (Original) An endoscope inserting direction detecting system according to Claim 3, wherein the direction of a lumen estimated from the distribution of pixels, of which values are equal to or larger than the threshold and which are placed between the plurality of circles having different radii, by the direction-of-lumen estimating means corresponds to the direction of the position at which the centers of the plurality of circles lie.

9-20. (Cancelled)